

## Self Opening Bag Stack and Method of Making Same

### Field of Invention

The invention pertains to plastic bags typically used for groceries, produce or other merchandise. More particularly, the invention relates to plastic bags for use with dispensing racks that are designed to open as bags are pulled from the dispenser.

### Background of the Invention

Plastic bags are commonly used in supermarkets, department stores and similar applications. These bags have advantages in that they are relatively inexpensive to produce, provide substantial carrying capacity and may include easily used handles. In order to make these bags easier to handle and easier to fill, they are usually used in combination with a dispensing rack or hook. Dispensing racks typically include a pair of horizontally oriented arms from which the bags are suspended by means of holes in upper portions of the bags. If the bags can be made to open as they are pulled from the dispensing rack or hook, they become substantially easier to use. Various techniques have been developed for causing plastic bags to open as they are removed from dispensing racks or hooks.

U.S. Patent No. 4,811,417, issued to *Prince et al.* is directed to a handled bag with supporting slits in the handle. The bag-pack is mounted on a support rack that has a base and a pair of supporting arms, as well as mounting fingers for holding a tab portion. The plurality of bags comprising the bag-pack are joined together near the top of the handles by means of welds. The welds are formed using a hot pin.

U.S. Patent No. 4,676,378 issued to *Baxley et al.*, discloses a bag pack comprising a stack of thermoplastic shopping bags that are bound together and mounted on a rack in such a manner that as one is removed from the rack, the next is opened and remains on the rack to receive material therein. The rack that is used in this invention for the bag pack comprises a flat base with a pair of laterally spaced support arms to accommodate fully expanded bags with handles engaged with the support arms. A transverse member extends between the support arms to support a tab receiving hook element for engagement through the tab apertures. When the bag pack is produced, and either prior to or simultaneously with the forming of a cut line through the stacked bag handles, the flaps are bonded together throughout the full stack. This is done by use of a heated pin or rod extended centrally through the flaps to directly heat seal the flaps together.

U.S. Patent No. 5,363,965, issued to *Nguyen* utilizes a self-opening thermoplastic bag system. The bags are supported on two horizontal arms that engage holes in the bag handles. The individual bags of the invention are held together in a bag pack via a heated or cold punch formed near the tab. The punches seen in this invention permeate the walls of the bags such that the rear wall of the next bag remains with the pack and is supported by the tab holding the opened bag in place on the rack as the lead bag is removed from the rack.

U.S. Patent No. 5,207,328, issued to *Bose et al* is directed to a thermoplastic bag and bag pack. The bag is made of a thermoplastic material such as high molecular weight, high density polyethylene. Each of the handles of the bags comprise multiple layers of material which results from the configuration utilizing folded pleats, thus there are four layers of material for each of the handles. Each of the handles has an aperture extending through the layers of material in the form of an irregular shaped slit. When the slits are cut, the resulting

slits in the material are connected at connection zones. This flexible connection permits loose interengagement of the layers of the inner slit material with some of the other layers of both the inner and outer slit materials. Thus, the need for cold welding or hot welding is eliminated and the alignment of the bags depends solely on the interengagement of the slit materials.

5       U.S. Patent No. 5,469,970 issued to *Li* discloses easy open stackable handle bags. The system comprises a bag pack for use with a bag rack made up of a plurality of aligned individual handle bags. The bags each have an area of adhesive between each bag that allows for the front wall of the successive bag to be pulled from one side as the previous bag is pulled from the bag rack.

10       U.S. Patent No. 5,865,313 issued to *Huang et al.* is directed to a plastic bag pack system with novel handle features. The central pad portions are preferably heat welded together, thus forming a stack of aligned central tab portions. The individual bags of the bag pack are treated on the outside surface by corona surface treatment that prepares the surfaces for receiving printing inks. When adjacent layers of corona surface treated plastic material are  
15       cut with a blade, they tend to frangibly bond together. This bonding gives rise to a self-opening feature. Both low density polyethylene and high density polyethylene may be used as the plastic material to form the bags described in this invention.

U.S. Patent No. 6,079,877 issued to *Chew* discloses a plastic bag with triangular cut tabs. The outer walls of adjacent bags have been corona-treated and this treatment along with  
20       appropriately disposed pressure points enable the bags of the pack to be self-opening.

While other variations exist, the above-described designs for self-opening bag stacks are typical of those encountered in the prior art. It is an objective of the present invention to provide for a polyethylene bag stack that is suitable for use with standardized dispensing racks

and includes a self-opening feature. It is a further objective to provide this capability in a bag stack that includes bags that are durable, break-resistant and easily produced. It is a still further objective of the invention to provide the above-described bag packs without the need for localized compressed areas in the bag stack.

5        While some of the objectives of the present invention are disclosed in the prior art, none of the inventions found include all of the requirements identified.

### Summary of the Invention

The present invention addresses all of the deficiencies of prior art self-opening bag stack inventions and satisfies all of the objectives described above.

(1) A self-opening bag stack providing the desired features may be constructed as follows. A plurality of stacked polyethylene film bags formulated from about 40-48 wt. % high density, high molecular weight polyethylene, 12-20 wt. % high density, medium molecular weight polyethylene, 20-30 wt. % linear low density polyethylene, 0-8 wt. % color concentrate are releasably adhered together in substantial registration. Each of the bags includes front and rear polyethylene film walls. Each of the front and rear walls have first and second side edges, a top edge and a bottom edge. The front and rear walls are integrally joined at their first and second side edges and secured together at their bottom edges. An open mouth portion is defined adjacent the top edges of the bags. At least an upper portion of an outer surface of the front and rear walls of each of the bags has been corona treated.

(2) In a variant of the invention, the self-opening bag stack includes 0.5 wt. % slip and antiblock compound.

(3) In another variant, the self-opening bag stack includes 1-3 wt. % calcium carbonate.

(4) In still another variant, the self-opening bag stack includes 10-20 wt. % recycled material, the recycled material comprising about 40-48 wt. % high density, high molecular weight polyethylene, 12-20 wt. % high density, medium molecular weight polyethylene, 20-30 wt. % linear low density polyethylene, 0-8 wt. % color concentrate.

(5) In yet another variant, 10-15 wt. % of the linear low density polyethylene has a density ranging from .923-.924 gm/cc.

(6) In a further variant 10-15 wt. % of said linear low density polyethylene has a melt index ranging from .25-.30 gm/10 minutes.

(7) In still a further variant, the high density, medium molecular weight polyethylene has a density ranging from .937-.947 gm/cc.

(8) In yet a further variant, the high density, medium molecular weight polyethylene has a melt index ranging from .10-.30 gm/10 minutes.

(9) In another variant of the invention, at least one cold staking area pierces and extends transversely through the bag stack for maintaining the bags in the bag stack in substantial registration.

(10) In still another variant, at least one hot melt pin area pierces and extends transversely through the bag stack for maintaining the bags in the bag stack in substantial registration.

(11) In a further variant, each of the bags includes longitudinally oriented side gussets.

(12) In a further variant, the self-opening bag stack has first and second openings. The first and second openings penetrate and extend transversely through the bag stack in the upper

portion of the bags. The openings are spaced downwardly from the top edge and spaced inwardly from the first and second side edges and serves to support the bag stack on horizontal arms of a dispensing rack.

(13) In still a further variant, each of the bags of the bag stack includes an upper seam.

5 The upper seam seals the front wall to the rear wall at their respective top edges. A U-shaped cut-out is provided. The U-shaped cut-out is located in an upper portion of the bag and begins at a first point along the upper seam. The first point is spaced inwardly from the first side edge and extends to a second point along the upper seam. The second point is spaced inwardly from the second side edge. The cut-out extends downwardly toward the bottom  
10 edges, thereby forming an open mouth portion and a pair of bag handles.

(14) In yet a further variant, first and second openings are provided. The first and second openings penetrate and extend transversely through the bag stack in an upper portion of the bag handles. The openings are spaced downwardly from the upper seam and serve to support the bag stack on horizontal arms of a dispensing rack.

15 (15) In still a further variant of the invention, at least one cold staking area pierces and extends transversely through the bag stack in the bag handles for maintaining the bags in the bag stack in substantial registration.

(16) In another variant, at least one hot melt pin area pierces and extends transversely through the bag stack in the bag handles for maintaining the bags in the bag stack in  
20 substantial registration.

(17) In yet another variant, a central tab portion is connected to the open mouth portion of the bags in the bag stack. An aperture is provided. The aperture extends transversely

through the bag stack within the central tab portion for suspending the bag stack from a dispensing member.

(18) In still another variant, at least one cold staking area pierces and extends transversely through the bag stack in the central tab portion for maintaining the bags in the 5 bag stack in substantial registration.

(19) In a further variant of the invention, at least one hot melt pin area pierces and extends transversely through the bag stack in the central tab portion for maintaining the bags in the bag stack in substantial registration.

(20) In still a further variant, the central tab portion of each bag in the bag stack is 10 detachably connected to the open mouth portion of the bags.

(21) In yet a further variant, the central tab portion of each bag in the bag stack includes a frangible section. The frangible section extends from the aperture to an outer edge of the central tab portion. The frangible section ruptures upon removal of the bag from the dispensing member.

(22) In another variant, the degree of corona treatment on the outer surfaces of the 15 front and rear walls of each of the bags is an amount sufficient to result in a surface tension on the corona treated surface of at least about 38 dynes/cm.

(23) In still another variant, a self-opening bag stack of t-shirt type bags includes a plurality of stacked polyethylene film bags formulated from about 40-48 wt. % high density, 20 high molecular weight polyethylene, 12-20 wt. % high density, medium molecular weight polyethylene, 20-30 wt. % linear low density polyethylene, 0-8 wt. % color concentrate. The bags are releasably adhered together in substantial registration. Each of the bags includes front and rear polyethylene film walls. Each of the front and rear walls have first and second

side edges, a top edge and a bottom edge. The front and rear walls are integrally joined at their first and second side edges and secured together at their bottom edges. An open mouth portion is defined adjacent the top edges. Each of the bags includes laterally spaced upwardly extending bag handles, an open mouth portion between the handles and a central support tab 5 portion extending upwardly from the open mouth portion. At least an upper portion of the outer surface of the front and rear walls of each of the bags having been corona treated.

(24) In yet another variant, the self-opening bag stack includes 0.5 wt. % slip and antiblock compound.

(25) In still another variant, the self-opening bag stack includes 1-3 wt. % calcium 10 carbonate.

(26) In a further variant, the self-opening bag stack includes 10-20 wt. % recycled material, the recycled material comprising about 40-48 wt. % high density, high molecular weight polyethylene, 12-20 wt. % high density, medium molecular weight polyethylene, 20-30 wt. % linear low density polyethylene, 0-8 wt. % color concentrate.

15 (27) In yet another variant, 10-15 wt. % of the linear low density polyethylene has a density ranging from .923-.924 gm/cc.

(28) In a further variant, 10-15 wt. % of said linear low density polyethylene has a melt index ranging from .25-.30 gm/10 minutes.

(29) In still a further variant, the high density, medium molecular weight polyethylene 20 has a density ranging from .937-.947 gm/cc.

(30) In yet a further variant, the high density, medium molecular weight polyethylene has a melt index ranging from .10-.30 gm/10 minutes.

(31) In still a further variant, at least one cold staking area pierces and extends transversely through the bag stack for maintaining the bags in the bag stack in substantial registration.

(32) In yet a further variant of the invention, at least one hot melt pin area pierces and 5 extends transversely through the bag stack for maintaining the bags in the bag stack in substantial registration.

(33) In another variant, each of the bags includes longitudinally oriented side gussets.

(34) In still another variant, first and second openings are provided. The first and second openings penetrate and extend transversely through the bag stack in an upper portion 10 of the bag handles. The openings are spaced downwardly from the upper seam and serves to support the bag stack on horizontal arms of the dispensing rack.

(35) In yet another variant, at least one cold staking area pierces and extends transversely through the bag stack in the bag handles for maintaining the bags in the bag stack in substantial registration.

15 (36) In a further variant, at least one hot melt pin area pierces and extends transversely through the bag stack in the bag handles for maintaining the bags in the bag stack in substantial registration.

(37) In yet a further variant, an aperture is provided. The aperture extends transversely through the bag stack within the central tab portion for suspending the bag stack from a 20 dispensing member.

(38) In still a further variant, at least one cold staking area pierces and extends transversely through the bag stack in the central tab portion for maintaining the bags in the bag stack in substantial registration.

(39) In another variant of the invention, at least one hot melt pin area pierces and extends transversely through the bag stack in the central tab portion for maintaining the bags in the bag stack in substantial registration.

(40) In still another variant, the central tab portion of each bag in the bag stack is 5 detachably connected to the open mouth portion of the bags.

(41) In yet another variant, the central tab portion of each bag in the bag stack includes a frangible section. The frangible section extends from the aperture to an outer edge of the central tab portion. The frangible portion ruptures upon removal of the bag from the dispensing member.

10 (42) In a final variant of the invention, the degree of corona treatment on the outer surfaces of the front and rear walls of each of the bags is an amount sufficient to result in a surface tension on the corona treated surface of at least about 38 dynes/cm.

An appreciation of the other aims and objectives of the present invention and an understanding of it may be achieved by referring to the accompanying drawings and the 15 detailed description of a preferred embodiment.

#### Description of the Drawings

**Figure 1** is a plan view of a gusseted handle bag stack with detachable central tab;

**Figure 2** is a plan view of an upper portion of a T-shirt style bag stack with 20 detachable central tab;

**Figure 3** is a plan view of an upper portion of a T-shirt style bag stack with non-detachable central tab;

**Figure 4** is a perspective view of the **Figure 2** embodiment disposed upon a dispensing rack; and

**Figure 5** is a perspective view of the **Figure 3** embodiment disposed upon a dispensing rack.

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Detailed Description of the Preferred Embodiment

The present invention addresses all of the deficiencies of prior art self-opening bag stack inventions and satisfies all of the objectives described above.

(1) As illustrated in **Figure 1**, a self-opening bag stack **10** providing the desired features may be constructed as follows. A plurality of stacked polyethylene film bags **15** formulated from about 40-48 wt. % high density, high molecular weight polyethylene, 12-20 wt. % high density, medium molecular weight polyethylene, 20-30 wt. % linear low density polyethylene, 0-8 wt. % color concentrate are releasably adhered together in substantial registration. Each of the bags **15** includes front **20** and rear **25** polyethylene film walls. Each of the front **20** and rear **25** walls have first **30** and second **35** side edges, a top edge **40** and a bottom edge **45**. The front **20** and rear **25** walls are integrally joined at their first **30** and second **35** side edges and secured together at their bottom edges **45**. An open mouth portion **50** is defined adjacent the top edges **40** of the bags **15**. At least an upper portion **55** of an outer surface **60** of the front **20** and rear **25** walls of each of the bags **15** has been corona treated.

(2) In a variant of the invention, the self-opening bag stack **10** includes 0.5 wt. % slip and antiblock compound.

(3) In another variant, the self-opening bag stack **10** includes 1-3 wt. % calcium carbonate.

(4) In still another variant the self-opening bag stack **10** includes 10-20 wt. % recycled material, the recycled material comprising about 40-48 wt. % high density, high molecular weight polyethylene, 12-20 wt. % high density, medium molecular weight polyethylene, 20-30 wt. % linear low density polyethylene, 0-8 wt. % color concentrate.

(5) In yet another variant, 10-15 wt. % of the linear low density polyethylene has a density ranging from .923-.924 gm/cc.

(6) In a further variant 10-15 wt. % of said linear low density polyethylene has a melt index ranging from .25-.30 gm/10 minutes.

(7) In still a further variant, the high density, medium molecular weight polyethylene has a density ranging from .937-.947 gm/cc.

(8) In yet a further variant, the high density, medium molecular weight polyethylene has a melt index ranging from .10-.30 gm/10 minutes.

(9) In another variant of the invention, as shown in **Figures 1 and 2**, at least one cold staking area **65** pierces and extends transversely through the bag stack **10** for maintaining the bags **15** in the bag stack **10** in substantial registration.

(10) In still another variant, as shown in **Figures 1 and 2**, at least one hot melt pin area **70** pierces and extends transversely through the bag stack **10** for maintaining the bags **15** in the bag stack **10** in substantial registration.

(11) In another variant, as shown in **Figures 1, 2, and 3**, each of the bags **15** includes longitudinally oriented side gussets **75**.

(12) In a further variant, as shown in **Figures 1, 4 and 5**, the self-opening bag stack **10** has first **77** and second **78** openings. The first **77** and second **78** openings penetrate and extend transversely through the bag stack **10** in the upper portion **55** of the bags **15**. The openings **77**, **78** are spaced downwardly from the top edge **40** and spaced inwardly from the first **30** and 5 second **35** side edges and serves to support the bag stack **10** on horizontal arms **130** of a dispensing rack **135**.

(13) In still a further variant, as illustrated in **Figures 2, 3, 4 and 5**, each of the bags **15** of the bag stack **10** includes an upper seam **80**. The upper seam **80** seals the front wall **20** to 10 the rear wall **25** at their respective top edges **40**. A U-shaped cut-out **85** is provided. The U-shaped cut-out **85** is located in an upper portion **90** of the bag **15** and begins at a first point **95** along the upper seam **80**. The first point **95** is spaced inwardly from the first side edge **30** and extends to a second point **100** along the upper seam **80**. The second point **100** is spaced inwardly from the second side edge **35**. The cut-out **85** extends downwardly toward the 15 bottom edges **45**, thereby forming the an open mouth portion **50** and a pair of bag handles **110**.

(14) In yet a further variant, as shown in **Figures 2, 3, 4, and 5**, first **115** and second **120** openings are provided. The first **115** and second **120** openings penetrate and extend transversely through the bag stack **10** in an upper portion **125** of the bag handles **110**. The 20 openings **115, 120** are spaced downwardly from the upper seam **80** and serve to support the bag stack **10** on horizontal arms **130** of a dispensing rack **135**.

(15) In still a further variant of the invention, as shown in **Figure 2**, at least one cold staking area **65** pierces and extends transversely through the bag stack **10** in the bag handles **110** for maintaining the bags **15** in the bag stack **10** in substantial registration.

(16) In another variant, as shown in **Figure 2**, at least one hot melt pin area **70** pierces and extends transversely through the bag stack **10** in the bag handles **110** for maintaining the bags **15** in the bag stack **10** in substantial registration.

(17) In yet another variant, as shown in **Figures 2, 3, 4, and 5**, a central tab portion **140** 5 is connected to the open mouth portion **50** of the bags **15** in the bag stack **10**. An aperture is provided **150**. The aperture **150** extends transversely through the bag stack **10** within the central tab portion **140** for suspending the bag stack **10** from a dispensing member **155**.

(18) In still another variant, as shown in **Figure 2**, at least one cold staking area **65** pierces and extends transversely through the bag stack **10** in the central tab portion **140** for 10 maintaining the bags **15** in the bag stack **10** in substantial registration.

(19) In a further variant of the invention, as shown in **Figure 2**, at least one hot melt pin area **70** pierces and extends transversely through the bag stack **10** in the central tab portion **140** for maintaining the bags in the bag stack **10** in substantial registration.

(20) In still a further variant, as illustrated in **Figure 2**, the central tab portion **140** of 15 each bag **15** in the bag stack **10** is detachably connected to the open mouth portion **50** of the bags **15**.

(21) In yet a further variant, as illustrated in **Figure 3**, the central tab portion **140** of 20 each bag **15** in the bag stack **10** includes a frangible section **160**. The frangible section **160** extends from the aperture **150** to an outer edge **165** of the central tab portion **140**. The frangible section **160** ruptures upon removal of the bag **15** from the dispensing member **155**.

(22) In another variant, the degree of corona treatment on the outer surfaces **60** of the front **20** and rear **25** walls of each of the bags **15** is an amount sufficient to result in a surface tension on the corona treated surface **60** of at least about 38 dynes/cm.

(23) In still another variant, a self-opening bag stack 10 of t-shirt type bags 170 includes a plurality of stacked polyethylene film bags 170 formulated from about 40-48 wt. % high density, high molecular weight polyethylene, 12-20 wt. % high density, medium molecular weight polyethylene, 20-30 wt. % linear low density polyethylene, 0-8 wt. % color 5 concentrate. The bags 170 are releasably adhered together in substantial registration. Each of the bags 170 includes front 20 and rear 25 polyethylene film walls. Each of the front 20 and rear 25 walls have first 30 and second 35 side edges, a top edge 40 and a bottom edge 45. The front 20 and rear 25 walls are integrally joined at their first 30 and second 35 side edges and secured together at their bottom edges 45. An open mouth portion 50 is defined adjacent the 10 top edges 40. Each of the bags 170 includes laterally spaced upwardly extending bag handles 110, an open mouth portion 50 between the handles 110 and a central support tab portion 140 extending upwardly from the open mouth portion 50. At least an upper portion 55 of the outer surface 60 of the front 20 and rear 25 walls of each of the bags 170 having been corona treated.

15 (24) In yet another variant, the self-opening bag stack 10 includes 0.5 wt. % slip and antiblock compound.

(25) In still another variant, the self-opening bag stack 10 includes 1-3 wt. % calcium carbonate.

(26) In a further variant, the self-opening bag stack 10 includes 10-20 wt. % recycled 20 material, the recycled material comprising about 40-48 wt. % high density, high molecular weight polyethylene, 12-20 wt. % high density, medium molecular weight polyethylene, 20-30 wt. % linear low density polyethylene, 0-8 wt. % color concentrate.

(27) In yet another variant, 10-15 wt. % of the linear low density polyethylene has a density ranging from .923-.924 gm/cc.

(28) In a further variant 10-15 wt. % of said linear low density polyethylene has a melt index ranging from .25-.30 gm/10 minutes.

5 (29) In still a further variant, the high density, medium molecular weight polyethylene has a density ranging from .937-.947 gm/cc.

(30) In yet a further variant, the high density, medium molecular weight polyethylene has a melt index ranging from .10-.30 gm/10 minutes.

10 (31) In still a further variant, as shown in **Figure 2**, at least one cold staking area **65** pierces and extends transversely through the bag stack **10** for maintaining the bags **15** in the bag stack **10** in substantial registration.

(32) In yet a further variant of the invention, as shown in **Figure 2**, at least one hot melt pin area **70** pierces and extends transversely through the bag stack **10** for maintaining the bags **170** in the bag stack **10** in substantial registration.

15 (33) In another variant, as shown in **Figures 1, 2 and 3**, each of the bags **170** includes longitudinally oriented side gussets **75**.

(34) In still another variant, as shown in **Figures 2 and 3**, first **115** and second **120** openings are provided. The first **115** and second **120** openings penetrate and extend transversely through the bag stack **10** in an upper portion **125** of the bag handles **110**. The 20 openings **115,120** are spaced downwardly from the upper seam **80** and serving to support the bag stack **10** on horizontal arms **130** of the dispensing rack **135**.

(35) In yet another variant, as shown in **Figures 2** and **3**, at least one cold staking area **65** pierces and extends transversely through the bag stack **10** in the bag handles **110** for maintaining the bags **170** in the bag stack **10** in substantial registration.

(36) In a further variant, as shown in **Figures 2** and **3** at least one hot melt pin area **70** **5** pierces and extends transversely through the bag stack **10** in the bag handles **110** for maintaining the bags **170** in the bag stack **10** in substantial registration.

(37) In yet a further variant, as shown in **Figures 3**, **4**, and **5**, an aperture **150** is provided. The aperture **150** extends transversely through the bag stack **10** within the central tab portion **140** for suspending the bag stack **10** from a dispensing member **155**.

(38) In still a further variant, as shown in **Figure 2**, at least one cold staking area **65** pierces and extends transversely through the bag stack **10** in the central tab portion **140** for maintaining the bags **170** in the bag stack **10** in substantial registration.

(39) In another variant of the invention, as shown in **Figure 2**, at least one hot melt pin area **70** pierces and extends transversely through the bag stack **10** in the central tab portion **140** for maintaining the bags **170** in the bag stack **10** in substantial registration.

(40) In still another variant, as shown in **Figure 2**, the central tab portion **140** of each bag **170** in the bag stack **10** is detachably connected to the open mouth portion **50** of the bags **15**.

(41) In yet another variant, as shown in **Figure 3**, the central tab portion **140** of each bag **170** in the bag stack **10** includes a frangible section **160**. The frangible section **160** extends from the aperture **150** to an outer edge **165** of the central tab portion **140**. The frangible portion **160** ruptures upon removal of the bag **170** from the dispensing member **155**.

(42) In a final variant of the invention, the degree of corona treatment on the outer surfaces **60** of the front **20** and rear **25** walls of each of the bags **170** is an amount sufficient to result in a surface tension on the corona treated surface **60** of at least about 38 dynes/cm.

An appreciation of the other aims and objectives of the present invention and an  
5 understanding of it may be achieved by referring to the accompanying drawings and the detailed description of a preferred embodiment.